CHAPTER 13. UTILITY IMPACT ANALYSIS

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CHAPTER 13. UTILITY IMPACT ANALYSIS

13.1 INTRODUCTION

The Department of Energy (DOE or Department) analyzed the effects of proposed distribution transformer energy-efficiency standard levels on the electric utility industry as part of the notice of proposed rulemaking (NOPR) analysis, using a variant of the U.S. DOE/Energy Information Administration (EIA)'s National Energy Modeling System (NEMS).[a] NEMS, which is available in the public domain, is a large, multi-sectoral, partial equilibrium model of the U.S. energy sector. DOE/EIA uses NEMS to produce a widely recognized baseline energy forecast for the U.S. through 2025, the *Annual Energy Outlook 2005* (*AEO2005*).[1] The Department used a variant known as NEMS-BT to provide key inputs to the analysis.[b] The utility impact analysis consists of a comparison between model results for the *AEO2005* Reference Case and for policy cases in which proposed standards are in place.

The Department conducted the utility impact analysis as policy deviations from the *AEO2005*, applying the same basic set of assumptions. For example, the operating characteristics (e.g., energy conversion efficiency, emissions rates) of future electricity generating plants are as specified in the *AEO2005* Reference Case, as are the prospects for natural gas supply. The utility impact analysis reports the changes in installed capacity and generation, by fuel type, that result for each trial standard level, as well as changes in end-use electricity sales.

13.2 ASSUMPTIONS

NEMS-BT has several advantages that have led to its adoption as the source for basic forecasting in DOE's energy-efficiency analyses for appliance standards. NEMS-BT relies on a set of assumptions that are well-known and fairly transparent, due to the exposure and scrutiny each *AEO* receives. In addition, the comprehensiveness of NEMS-BT permits the modeling of interactions among the various energy supply and demand sectors and the economy as a whole, so it produces a complete picture of the effects of energy-efficiency standards. Because it explicitly simulates the impact on the entire energy sector, NEMS-BT provides an accurate estimation of marginal effects. This approach yields better indicators of actual effects than estimates based on industry-wide average values.

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[a] For more information on NEMS, refer to the U.S. Department of Energy, Energy Information Administration documentation. A useful summary is *National Energy Modeling System: An Overview 2003*, DOE/EIA-0581(2003), March, 2003.

[b] DOE/EIA approves use of the name NEMS to describe only an official version of the model without any modification to code or data. Because this analysis entails some minor code modifications and the model is run under various policy scenarios that are variations on DOE/EIA assumptions, the Department refers to it by the name NEMS-BT (BT is DOE's Building Technologies Program, under whose aegis this work has been performed). NEMS-BT was previously called NEMS-BRS.

To be consistent with the system load data it used to develop the input load decrement for each proposed trial standard level, the Department replaced the default NEMS system load shape in the *AEO2005* Reference Case with one that represents normalized weather conditions for a typical meteorological year (TMY), which is referred to as the TMY system load.[2] The Department's reference case is thus called the TMY System Load Reference Case. The differences between the *AEO2005* Reference Case and the TMY System Load Reference Case are minor. For example, the total installed electricity generation capacity in the TMY System Load Reference Case is only 0.6 percent higher than the capacity in the *AEO2005* Reference Case in year 2025; total electricity generation is only 0.1 percent higher in the TMY System Load Reference Case.

The utility impact analysis used the assumptions of the *AEO2005* and treated transformer efficiency standards as variations in policy. The input load decrement represents an hourly reduction to the substituted system load that corresponds to the energy savings resulting from a proposed distribution transformer standard. Because the implementation of standards reduces electricity demand by less than one percent (between 0.01 and 0.8 percent in 2025) of total U.S. generation in any given year, its effect cannot be detected directly by simulations. Therefore, the Department simulated larger reductions in demand, and interpolated results as the difference between the TMY System Load Reference Case and the proposed standard result. The Department assumed the effects to be linear within the range of interpolation.

The Department also explored deviations from some of the *AEO2005* Reference Case assumptions, by representing two alternative futures: the High and Low Economic Growth Cases of *AEO2005.* The TMY System Load Reference Case corresponds to medium growth. The High Economic Growth Case assumes higher projected growth rates for population, labor force, and labor productivity, resulting in lower predicted inflation and interest rates relative to the Reference Case and higher overall aggregate economic growth. The opposite is true for the Low Economic Growth Case. The High Economic Growth Case reflects growth in per capita gross domestic product of 2.5 percent per year, compared with 2.2 percent per year in the Reference Case, and 1.9 percent per year in the Low Economic Growth Case. Economic output grows at a rate of 3.6 percent per year in the High Economic Growth Case, 3.1 percent per year in the Reference Case, and 2.5 percent per year in the Low Economic Growth Case. Different economic growth scenarios affect the rate of growth of electricity demand. The Department ran the High and Low Economic Growth Cases are only for the proposed standard level of each of two product classes: specifically, liquid-immersed transformers Trial Standard Level 2; and dry-type, medium-voltage transformers Trial Standard Level 2. During the course of this rulemaking, EPACT 2005 set the standard for low-voltage, dry-type transformers to TP 1, which is equivalent to Trial Standard Level 1. Tables 13.4.16 and 13.4.17 present the results for this standard level, for reference.

13.3 METHOD

The utility impact analysis consisted of NEMS-BT forecasts for generation, installed capacity, and end-use energy consumption. Results are presented in five-year increments to year 2025, including high and low economic growth cases for the proposed standard level. Beyond 2025, DOE used an exogenous model called NEMS-BT2 to model and report results to year 2038. The Department determined the size of the load decrement using data for the per-unit energy savings developed in the life-cycle cost (LCC) and payback period (PBP) analysis (Chapter 8 of this technical support document (TSD)) and the shipments forecast developed for the national impact analysis (Chapter 9).

Because the predicted reduction in capacity additions is sensitive to the peak load impact of the proposed standard, the Department developed a mathematical model of the hourly distribution transformer savings as a function of the hourly system load for each trial standard level. It applied energy decrements to each month of each specified forecast year, for three day types (week day, weekend, and peak day), for each hour of the day.

The Department used a *double-decrement* approach to model the utility sector effect; it made two energy decrements, one to the NEMS-BT system load and the other to end-use consumption.[3] Making a decrement to the hourly system load ensured that the utility impacts from this proposed standard were accurately represented and properly reflected the hourly decrements calculated using the TMY System Load.[4]

In addition, because NEMS-BT is essentially an energy model in which changes made to load shapes do not propagate to the demand modules, DOE decreased the energy from refrigeration end use in the commercial energy demand sector by an equivalent amount. Because no specific end use for distribution transformers is represented in NEMS-BT, the Department needed to decrease demand-side consumption to maintain an energy balance on the supply and demand sides of the model. The Department chose the refrigeration end use because it most closely represents the peak load behavior of distribution transformers. In the commercial demand module, energy is forecasted on an annual basis, so DOE took an annual decrement by region from refrigeration end-use consumption. To avoid double-counting—because energy is being taken out of both the electricity load shapes and the end-use energy accounting—DOE added back a compensating restoration factor in the electric utility module. Therefore, following this approach, DOE applied the energy decrement twice, but restored one of them. This approach guaranteed that both the energy and load sides of NEMS-BT would be consistent with the estimated energy savings.

Because the energy savings from distribution transformer standards are too small to produce stable power sector results in NEMS-BT, the Department estimated results for the trial standard levels using interpolation. To run a simulation in NEMS-BT, DOE reduced the system electricity load and commercial demand use annually, according to the energy savings estimated by the national energy savings (NES) Spreadsheet Model (see Chapter 10 in this TSD) for each trial standard level. These energy savings increase over time. The magnitude of the energy

decrement that would be required for NEMS-BT to produce stable results out of the range of numerical noise is greater than the highest standard level under consideration. Therefore, to estimate results for the trial standard levels considered here, DOE carried out a series of NEMS-BT runs, using higher values for the input energy savings. These runs established the relationship between the NEMS-BT outputs (e.g., installed capacity reductions, emissions reductions) and the energy savings inputs. The Department obtained results for energy savings corresponding to the trial standard levels using linear interpolation.

The Department then used the estimated reduction in total fuel generation at each trial standard level, as determined by interpolation, to determine emissions savings. First, it calculated annual marginal emissions rates for each of the simulations in each standard level, based on the actual output from NEMS-BT. Marginal emissions rates incorporate both effects of the standards—the emissions saved by the reduction in total generation, and the slight change in the emissions characteristics of the whole power sector that result from the slight change in plants used to generate electricity (dispatch) and capacity expansion. The net effect on the entire system is very small and, typically, the overall effect on emissions can be fully attributed to the reduced generation capacity. The Department then used the marginal emissions rates to determine the annual marginal emissions rates for each trial standard level (at multipliers of the trial standard level savings) by taking a simple average.

Since the AEO2005 version of NEMS forecasts only to the year 2025, the Department needed to extrapolate the results to 2038, to be consistent with the rest of the rulemaking analyses. For years 2026 through 2038, DOE estimated the results using a second version of NEMS-BT called NEMS-BT2 2050, which had been extensively modified to enable continued modeling through year 2050. The 2050 horizon year for NEMS-BT2 2050 was selected to accommodate rulemakings with life cycles longer than the 2025 horizon of the AEO2005 version of NEMS. This extension model was developed before the 2038 horizon year was chosen for the current rulemakings; therefore NEMS-BT2 2050 results for years 2039 through 2050 were ignored. This NEMS-BT2 2050 extension model is a modified version of the 2004 version of NEMS-BT. Due to the extensive nature of the modifications, it was impossible to incorporate the changes included in NEMS-BT2 2050 in the 2005 version of NEMS-BT. Using NEMS-BT2 2050, DOE derived results using the same interpolation approach described above and mathematically smoothed the transition from year 2025 to 2026 where the results for the two model versions are joined. The extrapolated results are shaded grey to distinguish them from the 2000–2025 results. For more information on the NEMS-BT2 2050 extension model, see Appendix 13A.

13.4 RESULTS

Table 13.4.1 shows the results from the TMY System Load Reference Case. Results for the various trial standard level cases are presented in Tables 13.4.2 through 13.4.14 for each of the two product classes: liquid-immersed and dry-type, medium-voltage transformers. Each

table shows forecasts using interpolated results as described in section 13.3 above for commercial energy sales, total U.S. electricity generation, and installed capacity.

Commercial energy sales fall for each proposed standard level compared to the TMY System Load Reference Case, due to the decrement made to commercial refrigeration. The decrease in sales is comparable to the amount of energy that the NES Model predicts will be saved by each standard, ranging from just over 0.01 percent to over 2.0 percent of total commercial electricity sales by year 2025. For each standard level, total U.S. electricity generation decreases relative to the TMY System Load Reference Case, by just under 0.8 percent in year 2025 of the maximum savings case (liquid-immersed transformer Trial Standard Level 6), but only by less than 0.01 percent in dry-type, medium-voltage transformer Trial Standard Level 1. Total installed capacity is also slightly reduced by each standard level, up to just over 0.6 percent in the final year of the maximum savings case.

The results under the High and Low Economic Growth cases are presented for the proposed standard level in Tables 13.4.15 through 13.4.19. Under the High Economic Growth scenario, the savings have a slightly higher impact, while the Low Growth scenario results in a slightly lower impact.

Table 13.4.1 TMY System Load Reference Case Forecast

NEMS-BT Results:

							Extrapolation		
	2000	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2038**
Commercial Sector Energy Consumption[1]									
Electricity Sales (TWh)[2]	1,159	1,262	1,467	1,652	1,858	2,094	2,159	2,214	2,250
Natural Gas (EJ)	3.43	3.33	3.68	3.89	4.14	4.40	4.59	4.80	4.98
Other (EJ)	0.99	0.99	1.10	1.15	1.20	1.27	1.32	1.38	1.41
Natural Gas (Quads)	3.25	3.16	3.49	3.69	3.92	4.17	4.35	4.55	4.72
Other (Quads)[3]	0.94	0.94	1.04	1.09	1.14	1.20	1.25	1.31	1.34
Total U.S. Electric Generation[4]									
Coal (TWh)	1,967	2,073	2,235	2,320	2,532	2,908	3,175	3,419	3,599
Gas (TWh)	601	679	913	1,163	1,346	1,385	1,370	1,384	1,370
Petroleum (TWh)	111	119	124	132	140	147	122	115	113
Nuclear (TWh)	754	796	813	826	830	830	830	828	824
Renewables (TWh)	355	409	436	443	465	496	516	521	527
Total (TWh)[5]	3,788	4,076	4,521	4,884	5,313	5,766	6,013	6,267	6,433
Installed Generating Capacity[6]									
Coal (GW)	314.7	314.5	314.2	320.1	347.6	399.2	436.2	470.6	496.3
Other Fossil (GW)[7]	283.0	442.5	451.6	452.4	508.6	549.4	567.3	571.5	578.2
Nuclear (GW)	98.3	99.7	100.6	102.2	102.7	102.7	102.7	102.7	102.7
Renewables (GW)	93.1	100.2	102.1	103.1	107.8	114.2	118.6	119.7	121.1
Total (GW)[8]	789.1	956.9	968.5	977.8	1,066.7	1,165.5	1,224.8	1,264.5	1,298.3

[1] Comparable to Table A2 of AEO2005: Energy Consumption, Commercial

[2] Comparable to Table A8 of AEO2005: Electricity Sales by Sector

[3] Includes distillate fuel, commercial fuel, kerosene, LPG, motor gasoline, coal, and renewable energy

[4] Comparable to Table A8 of AEO2005: Electric Generators and Cogenerators

[5] Excludes "Other Gaseous Fuels" cogenerators and "Other" cogenerators

[6] Comparable to Table A9 of AEO2005: Electric Generators and Cogenerators Capability

[7] Includes "Other Gaseous Fuels" cogenerators

[8] Excludes Pumped Storage and Fuel Cells

Table 13.4.2 Liquid-Immersed Transformers: Trial Standard Level 1 Forecast

NEMS-BT2005 Results:										Difference from TMY System Load Reference Case									
							Energy Savings										Energy Savings		
	2000	2005	2010	2015	2020	2025	2030	2035	2038		2000	2005	2010	2015	2020	2025	2030	2035	2038
Commercial Sector Energy Consumption										*Commercial Sector Energy Consumption*									
Electricity Sales (TWh)	1,159	1,262	1,466	1,649	1,853	2,086	2,149	2,201	2,236	Electricity Sales (TWh)	0.0	0.0	-1.4	-3.3	-5.4	-7.7	-10.1	-12.6	-14.0
Natural Gas (EJ)	3.43	3.33	3.68	3.89	4.14	4.40	4.59	4.80	4.98	Natural Gas (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (EJ)	0.99	0.99	1.10	1.15	1.20	1.27	1.32	1.38	1.41	Other (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas (Quads)	3.25	3.16	3.49	3.69	3.92	4.17	4.35	4.55	4.72	Natural Gas (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (Quads)	0.94	0.94	1.04	1.09	1.14	1.20	1.25	1.31	1.34	Other (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total U.S. Electric Generation										*Total U.S. Electric Generation*									
Coal (TWh)	1,967	2,023	2,235	2,319	2,529	2,903	3,170	3,412	3,589	Coal (TWh)	0.0	0.0	-0.2	-1.0	-2.8	-4.6	-4.6	-7.3	-9.7
Gas (TWh)	601	679	912	1,161	1,344	1,383	1,365	1,379	1,366	Gas (TWh)	0.0	0.0	-1.0	-1.7	-1.9	-2.4	-5.2	-5.2	-4.1
Petroleum (TWh)	111	119	124	132	140	147	122	115	113	Petroleum (TWh)	0.0	0.0	-0.1	-0.2	-0.3	-0.2	0.2	0.2	0.2
Nuclear (TWh)	754	796	813	826	830	830	830	828	824	Nuclear (TWh)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (TWh)	355	409	436	443	465	496	515	520	526	Renewables (TWh)	0.0	0.0	-0.3	-0.3	-0.4	-0.7	-0.7	-0.8	-0.9
Total (TWh)	3,788	4,026	4,519	4,881	5,308	5,758	6,003	6,254	6,419	Total (TWh)	0.0	0.0	-1.6	-3.3	-5.4	-7.9	-10.3	-13.0	-14.5
Installed Generating Capacity										*Installed Generating Capacity*									
Coal (GW)	314.7	314.5	314.2	320.0	347.2	398.6	435.6	469.6	495.0	Coal (GW)	0.0	0.0	0.0	-0.1	-0.4	-0.6	-0.6	-1.0	-1.3
Other Fossil (GW)	283.0	442.5	451.5	451.9	508.1	548.8	565.8	570.0	576.6	Other Fossil (GW)	0.0	0.0	-0.1	-0.5	-0.5	-0.6	-1.5	-1.5	-1.6
Nuclear (GW)	98.3	99.7	100.6	102.2	102.7	102.7	102.7	102.7	102.7	Nuclear (GW)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (GW)	93.1	100.2	102.1	103.1	107.2	114.1	118.4	119.5	120.9	Renewables (GW)	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.2	-0.2	-0.2
Total (GW)	789.1	956.9	968.4	977.2	1,065.2	1,164.2	1,222.6	1,261.8	1,295.2	Total (GW)	0.0	0.0	-0.1	-0.6	-0.9	-1.3	-2.2	-2.7	-3.1

Table 13.4.3 Liquid-Immersed Transformers: Trial Standard Level 2 Forecast

NEMS-BT2005 Results:										Difference from TMY System Load Reference Case									
							Extrapolation										Extrapolation		
	2000	2005	2010	2015	2020	2025	2030	2035	2038	2000	2005	2010	2015	2020	2025	2030	2035	2038
Commercial Sector Energy Consumption										*Commercial Sector Energy Consumption*									
Electricity Sales (TWh)	1,159	1,202	1,465	1,648	1,851	2,084	2,145	2,197	2,231	Electricity Sales (TWh)	0.0	0.0	-1.9	-4.4	-7.3	-10.4	-13.6	-17.0	-19.0
Natural Gas (EJ)	3.43	3.33	3.68	3.89	4.14	4.40	4.59	4.80	4.93	Natural Gas (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (EJ)	0.99	0.99	1.10	1.15	1.20	1.27	1.32	1.38	1.41	Other (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas (Quads)	3.25	3.16	3.49	3.69	3.92	4.17	4.35	4.55	4.72	Natural Gas (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (Quads)	0.94	0.94	1.04	1.09	1.14	1.20	1.25	1.31	1.34	Other (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total U.S. Electric Generation										*Total U.S. Electric Generation*									
Coal (TWh)	1,967	2,073	2,235	2,319	2,528	2,902	3,109	3,409	3,586	Coal (TWh)	0.0	0.0	-0.3	-1.4	-3.7	-6.2	-6.2	-9.9	-13.1
Gas (TWh)	601	679	912	1,161	1,343	1,382	1,363	1,377	1,364	Gas (TWh)	0.0	0.0	-1.3	-2.3	-2.6	-3.3	-7.0	-7.0	-5.5
Petroleum (TWh)	111	119	124	132	140	147	122	115	113	Petroleum (TWh)	0.0	0.0	-0.1	-0.3	-0.4	-0.3	0.2	0.2	0.2
Nuclear (TWh)	754	796	813	826	830	830	830	828	824	Nuclear (TWh)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (TWh)	355	409	436	443	464	495	515	520	526	Renewables (TWh)	0.0	0.0	-0.4	-0.4	-0.6	-0.9	-0.9	-1.1	-1.2
Total (TWh)	3,788	4,076	4,519	4,880	5,306	5,755	5,999	6,249	6,413	Total (TWh)	0.0	0.0	-2.2	-4.4	-7.3	-10.6	-13.9	-17.7	-19.6
Installed Generating Capacity										*Installed Generating Capacity*									
Coal (GW)	314.7	314.5	314.2	320.0	347.1	398.4	435.5	469.3	494.5	Coal (GW)	0.0	0.0	0.0	-0.1	-0.5	-0.8	-0.7	-1.3	-1.8
Other Fossil (GW)	283.0	442.5	451.5	451.7	507.9	548.6	565.3	569.4	576.1	Other Fossil (GW)	0.0	0.0	-0.1	-0.7	-0.7	-0.8	-2.0	-2.1	-2.1
Nuclear (GW)	98.3	99.7	100.6	102.2	102.7	102.7	102.7	102.7	102.7	Nuclear (GW)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (GW)	93.1	100.2	102.1	103.1	107.7	114.0	118.3	119.4	120.8	Renewables (GW)	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.3	-0.3	-0.3
Total (GW)	789.1	956.9	968.4	977.0	1,065.5	1,163.8	1,221.8	1,260.8	1,294.0	Total (GW)	0.0	0.0	-0.1	-0.8	-1.2	-1.7	-3.0	-3.7	-4.3

Table 13.4.4 Liquid-Immersed Transformers: Trial Standard Level 3 Forecast

NEMS-BT 2005 Results:							Extrapolation		
	2000	2005	2010	2015	2020	2025	2030	2035	2038
Commercial Sector Energy Consumption									
Electricity Sales (TWh)	1,159	1,262	1,465	1,646	1,848	2,081	2,141	2,192	2,226
Natural Gas (EJ)	3.43	3.33	3.68	3.89	4.14	4.40	4.59	4.80	4.98
Other (EJ)	0.99	0.99	1.10	1.15	1.20	1.27	1.32	1.38	1.41
Natural Gas (Quads)	3.25	3.16	3.49	3.69	3.92	4.17	4.35	4.55	4.72
Other (Quads)	0.94	0.94	1.04	1.09	1.14	1.20	1.25	1.31	1.34
Total U.S. Electric Generation									
Coal (TWh)	1,967	2,073	2,235	2,318	2,527	2,900	3,167	3,406	3,582
Gas (TWh)	601	679	911	1,160	1,343	1,381	1,361	1,375	1,363
Petroleum (TWh)	111	119	124	132	139	147	122	115	113
Nuclear (TWh)	754	796	813	826	830	830	830	828	824
Renewables (TWh)	355	409	436	443	464	495	515	520	525
Total (TWh)	3,788	4,076	4,518	4,878	5,303	5,752	5,995	6,244	6,408
Installed Generating Capacity									
Coal (GW)	314.7	314.5	314.2	319.9	347.0	398.2	435.2	468.9	494.0
Other Fossil (GW)	283.0	442.5	451.5	451.5	507.7	548.4	564.7	568.8	575.5
Nuclear (GW)	98.3	99.7	100.6	102.2	102.7	102.7	102.7	102.7	102.7
Renewables (GW)	93.1	100.2	102.1	103.1	107.7	114.0	118.2	119.3	120.7
Total (GW)	789.1	956.9	968.4	976.7	1,065.1	1,163.3	1,220.9	1,259.8	1,292.8

Difference from TMY System Load Reference Case							Extrapolation		
	2000	2005	2010	2015	2020	2025	2030	2035	2038
Commercial Sector Energy Consumption									
Electricity Sales (TWh)	0.0	0.0	-2.5	-5.8	-9.5	-13.5	-17.7	-21.9	-24.5
Natural Gas (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total U.S. Electric Generation									
Coal (TWh)	0.0	0.0	-0.4	-1.8	-4.9	-8.1	-8.1	-12.7	-16.9
Gas (TWh)	0.0	0.0	-1.8	-3.0	-3.3	-4.3	-9.0	-9.0	-7.1
Petroleum (TWh)	0.0	0.0	-0.2	-0.4	-0.6	-0.3	0.3	0.3	0.3
Nuclear (TWh)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (TWh)	0.0	0.0	-0.5	-0.5	-0.8	-1.2	-1.2	-1.4	-1.5
Total (TWh)	0.0	0.0	-2.9	-5.8	-9.5	-13.9	-18.0	-22.7	-25.2
Installed Generating Capacity									
Coal (GW)	0.0	0.0	0.0	-0.2	-0.6	-1.0	-1.0	-1.7	-2.3
Other Fossil (GW)	0.0	0.0	-0.1	-0.9	-0.9	-1.0	-2.6	-2.7	-2.7
Nuclear (GW)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (GW)	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.4	-0.4	-0.4
Total (GW)	0.0	0.0	-0.1	-1.1	-1.6	-2.2	-3.9	-4.7	-5.5

Table 13.4.5 Liquid-Immersed Transformers: Trial Standard Level 4 Forecast

NEMS-BT 2005 Results:							Extrapolation		
	2000	2005	2010	2015	2020	2025	2030	2035	2038
Commercial Sector Energy Consumption									
Electricity Sales (TWh)	1,159	1,262	1,464	1,645	1,847	2,079	2,139	2,189	2,222
Natural Gas (EJ)	3.43	3.33	3.68	3.89	4.14	4.40	4.59	4.80	4.98
Other (EJ)	0.99	0.99	1.10	1.15	1.20	1.27	1.32	1.38	1.41
Natural Gas (Quads)	3.25	3.16	3.49	3.69	3.92	4.17	4.35	4.55	4.72
Other (Quads)	0.94	0.94	1.04	1.09	1.14	1.20	1.25	1.31	1.34
Total U.S. Electric Generation									
Coal (TWh)	1,967	2,073	2,235	2,318	2,526	2,899	3,166	3,405	3,580
Gas (TWh)	601	679	911	1,160	1,342	1,380	1,360	1,374	1,362
Petroleum (TWh)	111	119	124	132	139	147	122	115	113
Nuclear (TWh)	754	796	813	826	830	830	830	828	824
Renewables (TWh)	355	409	435	442	464	495	515	519	525
Total (TWh)	3,788	4,076	4,518	4,877	5,302	5,750	5,993	6,241	6,404
Installed Generating Capacity									
Coal (GW)	314.7	314.5	314.2	319.9	346.9	398.0	435.1	468.7	493.7
Other Fossil (GW)	283.0	442.5	451.5	451.4	507.6	548.3	564.4	568.5	575.1
Nuclear (GW)	98.3	99.7	100.6	102.2	102.7	102.7	102.7	102.7	102.7
Renewables (GW)	93.1	100.2	102.1	103.1	107.7	114.0	118.2	119.3	120.6
Total (GW)	789.1	956.9	968.4	976.6	1,064.9	1,163.0	1,220.4	1,259.2	1,292.1

Difference from TMY System Load Reference Case							Extrapolation		
	2000	2005	2010	2015	2020	2025	2030	2035	2038
Commercial Sector Energy Consumption									
Electricity Sales (TWh)	0.0	0.0	-2.8	-6.6	-10.8	-15.3	-20.0	-24.9	-27.8
Natural Gas (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total U.S. Electric Generation									
Coal (TWh)	0.0	0.0	-0.5	-2.1	-5.5	-9.1	-9.2	-14.4	-19.2
Gas (TWh)	0.0	0.0	-2.0	-3.4	-3.8	-4.8	-10.2	-10.2	-8.1
Petroleum (TWh)	0.0	0.0	-0.2	-0.5	-0.6	-0.4	0.4	0.4	0.3
Nuclear (TWh)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (TWh)	0.0	0.0	-0.5	-0.5	-0.9	-1.4	-1.4	-1.6	-1.8
Total (TWh)	0.0	0.0	-3.3	-6.6	-10.8	-15.7	-20.4	-25.8	-28.6
Installed Generating Capacity									
Coal (GW)	0.0	0.0	0.0	-0.2	-0.7	-1.2	-1.1	-1.9	-2.6
Other Fossil (GW)	0.0	0.0	-0.1	-1.0	-1.0	-1.1	-2.9	-3.0	-3.1
Nuclear (GW)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (GW)	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.4	-0.4	-0.5
Total (GW)	0.0	0.0	-0.1	-1.2	-1.8	-2.5	-4.4	-5.3	-6.2

Table 13.4.6 Liquid-Immersed Transformers: Trial Standard Level 5 Forecast

NEMS-BT 2005 Results:							Extrapolation		
	2000	2005	2010	2015	2020	2025	2030	2035	2038
Commercial Sector Energy Consumption									
Electricity Sales (TWh)	1,159	1,262	1,462	1,639	1,837	2,064	2,120	2,166	2,196
Natural Gas (EJ)	3.43	3.33	3.68	3.89	4.14	4.40	4.59	4.80	4.98
Other (EJ)	0.99	0.99	1.10	1.15	1.20	1.27	1.32	1.38	1.41
Natural Gas (Quads)	3.25	3.16	3.49	3.69	3.92	4.17	4.35	4.55	4.72
Other (Quads)	0.94	0.94	1.04	1.09	1.14	1.20	1.25	1.31	1.34
Total U.S. Electric Generation									
Coal (TWh)	1,967	2,073	2,234	2,316	2,521	2,890	3,157	3,391	3,562
Gas (TWh)	601	679	909	1,156	1,339	1,376	1,350	1,364	1,354
Petroleum (TWh)	111	119	124	131	139	146	123	116	114
Nuclear (TWh)	754	796	813	826	830	830	830	828	824
Renewables (TWh)	355	409	435	442	463	493	513	518	524
Total (TWh)	3,788	4,076	4,515	4,871	5,292	5,736	5,973	6,217	6,377
Installed Generating Capacity									
Coal (GW)	314.7	314.5	314.2	319.7	346.2	396.9	434.1	466.9	491.2
Other Fossil (GW)	283.0	442.5	451.4	450.5	506.6	547.2	561.7	565.6	572.1
Nuclear (GW)	98.3	99.7	100.6	102.2	102.7	102.7	102.7	102.7	102.7
Renewables (GW)	93.1	100.2	102.1	103.1	107.6	113.8	117.8	118.9	120.2
Total (GW)	789.1	956.9	968.3	975.5	1,063.2	1,160.6	1,216.3	1,254.1	1,286.2

Difference from TMY System Load Reference Case							Extrapolation		
	2000	2005	2010	2015	2020	2025	2030	2035	2038
Commercial Sector Energy Consumption									
Electricity Sales (TWh)	0.0	0.0	-5.4	-12.7	-20.7	-29.5	-38.9	-48.5	-54.2
Natural Gas (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total U.S. Electric Generation									
Coal (TWh)	0.0	0.0	-0.9	-4.0	-10.6	-17.6	-17.8	-28.1	-37.4
Gas (TWh)	0.0	0.0	-3.9	-6.6	-7.3	-9.3	-19.9	-20.0	-15.7
Petroleum (TWh)	0.0	0.0	-0.4	-0.9	-1.2	-0.8	0.7	0.7	0.6
Nuclear (TWh)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (TWh)	0.0	0.0	-1.0	-1.0	-1.6	-2.6	-2.7	-3.0	-3.4
Total (TWh)	0.0	0.0	-6.3	-12.6	-20.8	-30.3	-39.6	-50.4	-55.9
Installed Generating Capacity									
Coal (GW)	0.0	0.0	0.0	-0.4	-1.4	-2.3	-2.1	-3.7	-5.1
Other Fossil (GW)	0.0	0.0	-0.2	-1.9	-2.0	-2.2	-5.6	-5.9	-6.1
Nuclear (GW)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (GW)	0.0	0.0	0.0	0.0	-0.2	-0.4	-0.8	-0.8	-0.9
Total (GW)	0.0	0.0	-0.2	-2.3	-3.5	-4.9	-8.5	-10.4	-12.1

Table 13.4.7 Liquid-Immersed Transformers: Trial Standard Level 6 Forecast

NEMS-BT 2005 Results:							Extrapolation		
	2000	2005	2010	2015	2020	2025	2030	2035	2038
Commercial Sector Energy Consumption									
Electricity Sales (TWh)	1,159	1,262	1,459	1,634	1,828	2,052	2,103	2,145	2,173
Natural Gas (EJ)	3.43	3.33	3.68	3.89	4.14	4.40	4.59	4.80	4.98
Other (EJ)	0.99	0.99	1.10	1.15	1.20	1.27	1.32	1.38	1.41
Natural Gas (Quads)	3.25	3.16	3.49	3.69	3.92	4.17	4.35	4.55	4.72
Other (Quads)	0.94	0.94	1.04	1.09	1.14	1.20	1.25	1.31	1.34
Total U.S. Electric Generation									
Coal (TWh)	1,967	2,073	2,234	2,314	2,517	2,883	3,149	3,379	3,546
Gas (TWh)	601	679	907	1,153	1,336	1,372	1,342	1,355	1,348
Petroleum (TWh)	111	119	123	131	138	146	123	116	114
Nuclear (TWh)	754	796	813	826	830	830	830	828	824
Renewables (TWh)	355	409	434	441	463	492	512	517	522
Total (TWh)	3,788	4,076	4,512	4,866	5,283	5,722	5,956	6,195	6,353
Installed Generating Capacity									
Coal (GW)	314.7	314.5	314.2	319.6	345.6	395.9	433.1	465.3	489.0
Other Fossil (GW)	283.0	442.5	451.3	449.6	505.8	546.3	559.3	563.0	569.5
Nuclear (GW)	98.3	99.7	100.6	102.2	102.7	102.7	102.7	102.7	102.7
Renewables (GW)	93.1	100.2	102.1	103.1	107.5	113.6	117.5	118.6	119.8
Total (GW)	789.1	956.9	968.2	974.5	1,061.6	1,158.5	1,212.6	1,249.6	1,281.0

Difference from TMY System Load Reference Case							Extrapolation		
	2000	2005	2010	2015	2020	2025	2030	2035	2038
Commercial Sector Energy Consumption									
Electricity Sales (TWh)	0.0	0.0	-7.8	-18.3	-29.9	-42.4	-55.7	-69.4	-77.5
Natural Gas (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total U.S. Electric Generation									
Coal (TWh)	0.0	0.0	-1.4	-5.8	-15.3	-25.3	-25.5	-40.1	-53.4
Gas (TWh)	0.0	0.0	-5.6	-9.5	-10.5	-13.4	-28.5	-28.5	-22.5
Petroleum (TWh)	0.0	0.0	-0.6	-1.4	-1.7	-1.1	1.0	1.0	0.9
Nuclear (TWh)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (TWh)	0.0	0.0	-1.5	-1.5	-2.4	-3.8	-3.8	-4.3	-4.9
Total (TWh)	0.0	0.0	-9.1	-18.2	-29.9	-43.6	-56.8	-72.0	-79.9
Installed Generating Capacity									
Coal (GW)	0.0	0.0	0.0	-0.5	-2.0	-3.3	-3.1	-5.3	-7.3
Other Fossil (GW)	0.0	0.0	-0.3	-2.8	-2.8	-3.1	-8.0	-8.5	-8.7
Nuclear (GW)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (GW)	0.0	0.0	0.0	0.0	-0.3	-0.6	-1.1	-1.1	-1.3
Total (GW)	0.0	0.0	-0.3	-3.3	-5.1	-7.0	-12.2	-14.9	-17.3

Table 13.4.8 Dry-Type, Low-Voltage Transformers: Trial Standard Level 1 Forecast

NEMS-BT 2005 Results:							Extrapolation		
	2000	2005	2010	2015	2020	2025	2030	2035	2038
Commercial Sector Energy Consumption									
Electricity Sales (TWh)	1,159	1,262	1,461	1,639	1,837	2,064	2,120	2,167	2,197
Natural Gas (EJ)	3.43	3.33	3.68	3.89	4.14	4.40	4.59	4.80	4.98
Other (EJ)	0.99	0.99	1.10	1.15	1.20	1.27	1.32	1.38	1.41
Natural Gas (Quads)	3.25	3.16	3.49	3.69	3.92	4.17	4.35	4.55	4.72
Other (Quads)	0.94	0.94	1.04	1.09	1.14	1.20	1.25	1.31	1.34
Total U.S. Electric Generation									
Coal (TWh)	1,967	2,073	2,234	2,316	2,518	2,886	3,157	3,393	3,562
Gas (TWh)	601	679	909	1,155	1,341	1,379	1,350	1,363	1,355
Petroleum (TWh)	111	119	124	131	139	146	122	115	113
Nuclear (TWh)	754	796	813	826	830	830	830	828	824
Renewables (TWh)	355	409	435	442	463	494	514	519	524
Total (TWh)	3,788	4,076	4,515	4,871	5,291	5,735	5,973	6,218	6,379
Installed Generating Capacity									
Coal (GW)	314.7	314.5	314.2	319.8	345.7	396.4	434.1	467.5	491.4
Other Fossil (GW)	283.0	442.5	451.5	450.7	507.5	548.4	562.6	567.0	573.7
Nuclear (GW)	98.3	99.7	100.6	102.2	102.7	102.7	102.7	102.7	102.7
Renewables (GW)	93.1	100.2	102.1	103.1	107.6	113.8	118.0	119.1	120.3
Total (GW)	789.1	956.9	968.4	975.8	1,063.5	1,161.2	1,217.5	1,256.3	1,288.1

Difference from TMY System Load Reference Case							Extrapolation		
	2000	2005	2010	2015	2020	2025	2030	2035	2038
Commercial Sector Energy Consumption									
Electricity Sales (TWh)	0.0	0.0	-5.7	-13.3	-21.4	-29.9	-38.6	-47.4	-52.6
Natural Gas (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total U.S. Electric Generation									
Coal (TWh)	0.0	0.0	-0.7	-3.8	-14.2	-22.2	-18.3	-25.6	-37.2
Gas (TWh)	0.0	0.0	-4.4	-7.8	-5.4	-6.2	-19.9	-21.5	-14.8
Petroleum (TWh)	0.0	0.0	-0.3	-0.7	-1.0	-0.7	0.2	0.0	0.1
Nuclear (TWh)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (TWh)	0.0	0.0	-0.9	-1.0	-1.6	-2.4	-2.0	-2.1	-2.6
Total (TWh)	0.0	0.0	-6.4	-13.2	-22.1	-31.5	-40.1	-49.2	-54.5
Installed Generating Capacity									
Coal (GW)	0.0	0.0	0.0	-0.3	-1.9	-2.8	-2.1	-3.1	-4.9
Other Fossil (GW)	0.0	0.0	-0.1	-1.7	-1.1	-1.0	-4.7	-4.5	-4.5
Nuclear (GW)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (GW)	0.0	0.0	0.0	0.0	-0.2	-0.4	-0.6	-0.6	-0.8
Total (GW)	0.0	0.0	-0.1	-2.0	-3.2	-4.3	-7.3	-8.2	-10.2

Table 13.4.9 Dry-Type, Medium-Voltage Transformers: Trial Standard Level 1 Forecast

NEMS-BT 2005 Results:							Extrapolation		
	2000	2005	2010	2015	2020	2025	2030	2035	2038
Commercial Sector Energy Consumption									
Electricity Sales (TWh)	1,159	1,262	1,467	1,652	1,858	2,094	2,159	2,213	2,249
Natural Gas (EJ)	3.43	3.33	3.68	3.89	4.14	4.40	4.59	4.80	4.98
Other (EJ)	0.99	0.99	1.10	1.15	1.20	1.27	1.32	1.38	1.41
Natural Gas (Quads)	3.25	3.16	3.49	3.69	3.92	4.17	4.35	4.55	4.72
Other (Quads)	0.94	0.94	1.04	1.09	1.14	1.20	1.25	1.31	1.34
Total U.S. Electric Generation									
Coal (TWh)	1,967	2,073	2,235	2,320	2,532	2,908	3,175	3,419	3,599
Gas (TWh)	601	679	913	1,163	1,346	1,385	1,370	1,384	1,370
Petroleum (TWh)	111	119	124	132	140	147	122	115	113
Nuclear (TWh)	754	796	813	826	830	830	830	828	824
Renewables (TWh)	355	409	436	443	465	496	516	521	527
Total (TWh)	3,788	4,076	4,521	4,884	5,313	5,766	6,013	6,266	6,432
Installed Generating Capacity									
Coal (GW)	314.7	314.5	314.2	320.1	347.6	399.2	436.2	470.6	496.2
Other Fossil (GW)	283.0	442.5	451.6	452.4	508.6	549.4	567.2	571.5	578.2
Nuclear (GW)	98.3	99.7	100.6	102.2	102.7	102.7	102.7	102.7	102.7
Renewables (GW)	93.1	100.2	102.1	103.1	107.8	114.2	118.6	119.7	121.1
Total (GW)	789.1	956.9	968.5	977.8	1,066.7	1,165.5	1,224.7	1,264.4	1,298.2

Difference from TMY System Load Reference Case							Extrapolation		
	2000	2005	2010	2015	2020	2025	2030	2035	2038
Commercial Sector Energy Consumption									
Electricity Sales (TWh)	0.0	0.0	-0.1	-0.1	-0.2	-0.3	-0.4	-0.5	-0.6
Natural Gas (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total U.S. Electric Generation									
Coal (TWh)	0.0	0.0	0.0	0.0	-0.2	-0.2	-0.2	-0.3	-0.4
Gas (TWh)	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.2	-0.2	-0.2
Petroleum (TWh)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nuclear (TWh)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (TWh)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total (TWh)	0.0	0.0	-0.1	-0.1	-0.2	-0.3	-0.4	-0.5	-0.6
Installed Generating Capacity									
Coal (GW)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1
Other Fossil (GW)	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0
Nuclear (GW)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (GW)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total (GW)	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1

Table 13.4.10 Dry-Type, Medium-Voltage Transformers: Trial Standard Level 2 Forecast

NEMS-BT 2005 Results:							Extrapolation		
	2000	2005	2010	2015	2020	2025	2030	2035	2038
Commercial Sector Energy Consumption									
Electricity Sales (TWh)	1,159	1,262	1,467	1,652	1,858	2,093	2,158	2,213	2,249
Natural Gas (EJ)	3.43	3.33	3.68	3.89	4.14	4.40	4.59	4.80	4.98
Other (EJ)	0.99	0.99	1.10	1.15	1.20	1.27	1.32	1.38	1.41
Natural Gas (Quads)	3.25	3.16	3.49	3.69	3.92	4.17	4.35	4.55	4.72
Other (Quads)	0.94	0.94	1.04	1.09	1.14	1.20	1.25	1.31	1.34
Total U.S. Electric Generation									
Coal (TWh)	1,967	2,073	2,235	2,320	2,532	2,908	3,175	3,419	3,598
Gas (TWh)	601	679	913	1,163	1,346	1,385	1,370	1,384	1,370
Petroleum (TWh)	111	119	124	132	140	147	122	115	113
Nuclear (TWh)	754	796	813	826	830	830	830	828	824
Renewables (TWh)	355	409	436	443	465	496	516	521	527
Total (TWh)	3,788	4,076	4,521	4,884	5,313	5,765	6,012	6,266	6,432
Installed Generating Capacity									
Coal (GW)	314.7	314.5	314.2	320.1	347.6	399.2	436.2	470.5	496.2
Other Fossil (GW)	283.0	442.5	451.6	452.4	508.6	549.4	567.2	571.4	578.1
Nuclear (GW)	98.3	99.7	100.6	102.2	102.7	102.7	102.7	102.7	102.7
Renewables (GW)	93.1	100.2	102.1	103.1	107.8	114.2	118.6	119.7	121.1
Total (GW)	789.1	956.9	968.5	977.8	1,066.6	1,165.4	1,224.7	1,264.4	1,298.1

Difference from TMY System Load Reference Case							Extrapolation		
	2000	2005	2010	2015	2020	2025	2030	2035	2038
Commercial Sector Energy Consumption									
Electricity Sales (TWh)	0.0	0.0	-0.1	-0.2	-0.4	-0.5	-0.7	-0.8	-0.9
Natural Gas (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total U.S. Electric Generation									
Coal (TWh)	0.0	0.0	0.0	-0.1	-0.2	-0.4	-0.3	-0.4	-0.6
Gas (TWh)	0.0	0.0	-0.1	-0.1	-0.1	-0.1	-0.3	-0.4	-0.3
Petroleum (TWh)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nuclear (TWh)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (TWh)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total (TWh)	0.0	0.0	-0.1	-0.2	-0.4	-0.5	-0.7	-0.8	-0.9
Installed Generating Capacity									
Coal (GW)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1
Other Fossil (GW)	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1
Nuclear (GW)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (GW)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total (GW)	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1	-0.2

Table 13.4.11 Dry-Type, Medium-Voltage Transformers: Trial Standard Level 3 Forecast

NEMS-BT 2005 Results:							Extrapolation		
	2000	2005	2010	2015	2020	2025	2030	2035	2038
Commercial Sector Energy Consumption									
Electricity Sales (TWh)	1,159	1,262	1,467	1,652	1,857	2,093	2,158	2,213	2,249
Natural Gas (EJ)	3.43	3.33	3.68	3.89	4.14	4.40	4.59	4.80	4.98
Other (EJ)	0.99	0.99	1.10	1.15	1.20	1.27	1.32	1.38	1.41
Natural Gas (Quads)	3.25	3.16	3.49	3.69	3.92	4.17	4.35	4.55	4.72
Other (Quads)	0.94	0.94	1.04	1.09	1.14	1.20	1.25	1.31	1.34
Total U.S. Electric Generation									
Coal (TWh)	1,967	2,073	2,235	2,320	2,532	2,907	3,175	3,418	3,598
Gas (TWh)	601	679	913	1,163	1,346	1,385	1,370	1,383	1,370
Petroleum (TWh)	111	119	124	132	140	147	122	115	113
Nuclear (TWh)	754	796	813	826	830	830	830	828	824
Renewables (TWh)	355	409	436	443	465	496	516	521	527
Total (TWh)	3,788	4,076	4,521	4,884	5,312	5,765	6,012	6,266	6,432
Installed Generating Capacity									
Coal (GW)	314.7	314.5	314.2	320.1	347.6	399.1	436.1	470.5	496.2
Other Fossil (GW)	283.0	442.5	451.6	452.4	508.6	549.4	567.2	571.4	578.1
Nuclear (GW)	98.3	99.7	100.6	102.2	102.7	102.7	102.7	102.7	102.7
Renewables (GW)	93.1	100.2	102.1	103.1	107.8	114.2	118.6	119.7	121.1
Total (GW)	789.1	956.9	968.5	977.8	1,066.6	1,165.4	1,224.6	1,264.3	1,298.0

Difference from TMY System Load Reference Case							Extrapolation		
	2000	2005	2010	2015	2020	2025	2030	2035	2038
Commercial Sector Energy Consumption									
Electricity Sales (TWh)	0.0	0.0	-0.1	-0.3	-0.5	-0.7	-1.0	-1.2	-1.3
Natural Gas (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total U.S. Electric Generation									
Coal (TWh)	0.0	0.0	0.0	-0.1	-0.3	-0.5	-0.5	-0.6	-0.9
Gas (TWh)	0.0	0.0	-0.1	-0.2	-0.1	-0.2	-0.5	-0.5	-0.4
Petroleum (TWh)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nuclear (TWh)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (TWh)	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	-0.1
Total (TWh)	0.0	0.0	-0.2	-0.3	-0.5	-0.8	-1.0	-1.2	-1.3
Installed Generating Capacity									
Coal (GW)	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1
Other Fossil (GW)	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1
Nuclear (GW)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (GW)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total (GW)	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.2	-0.2	-0.3

Table 13.4.12 Dry-Type, Medium-Voltage Transformers: Trial Standard Level 4 Forecast

NEMS-BT 2005 Results:							Extrapolation		
	2000	2005	2010	2015	2020	2025	2030	2035	2038
Commercial Sector Energy Consumption									
Electricity Sales (TWh)	1,159	1,262	1,467	1,652	1,857	2,093	2,158	2,212	2,248
Natural Gas (EJ)	3.43	3.33	3.68	3.89	4.14	4.40	4.59	4.80	4.98
Other (EJ)	0.99	0.99	1.10	1.15	1.20	1.27	1.32	1.38	1.41
Natural Gas (Quads)	3.25	3.16	3.49	3.69	3.92	4.17	4.35	4.55	4.72
Other (Quads)	0.94	0.94	1.04	1.09	1.14	1.20	1.25	1.31	1.34
Total U.S. Electric Generation									
Coal (TWh)	1,967	2,073	2,235	2,320	2,531	2,907	3,174	3,418	3,598
Gas (TWh)	601	679	913	1,163	1,346	1,385	1,369	1,383	1,369
Petroleum (TWh)	111	119	124	132	140	147	122	115	113
Nuclear (TWh)	754	796	813	826	830	830	830	828	824
Renewables (TWh)	355	409	436	443	465	496	516	521	527
Total (TWh)	3,788	4,076	4,521	4,884	5,312	5,765	6,011	6,265	6,431
Installed Generating Capacity									
Coal (GW)	314.7	314.5	314.2	320.1	347.5	399.1	436.1	470.5	496.1
Other Fossil (GW)	283.0	442.5	451.6	452.3	508.6	549.4	567.1	571.3	578.0
Nuclear (GW)	98.3	99.7	100.6	102.2	102.7	102.7	102.7	102.7	102.7
Renewables (GW)	93.1	100.2	102.1	103.1	107.8	114.2	118.6	119.7	121.1
Total (GW)	789.1	956.9	968.5	977.7	1,066.6	1,165.3	1,224.5	1,264.2	1,297.9

Difference from TMY System Load Reference Case							Extrapolation		
	2000	2005	2010	2015	2020	2025	2030	2035	2038
Commercial Sector Energy Consumption									
Electricity Sales (TWh)	0.0	0.0	-0.2	-0.5	-0.8	-1.1	-1.5	-1.8	-2.0
Natural Gas (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total U.S. Electric Generation									
Coal (TWh)	0.0	0.0	0.0	-0.1	-0.5	-0.8	-0.7	-1.0	-1.4
Gas (TWh)	0.0	0.0	-0.2	-0.3	-0.2	-0.2	-0.7	-0.8	-0.6
Petroleum (TWh)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nuclear (TWh)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (TWh)	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1	-0.1
Total (TWh)	0.0	0.0	-0.2	-0.5	-0.8	-1.2	-1.5	-1.8	-2.0
Installed Generating Capacity									
Coal (GW)	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1	-0.2
Other Fossil (GW)	0.0	0.0	0.0	-0.1	0.0	0.0	-0.2	-0.2	-0.2
Nuclear (GW)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (GW)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total (GW)	0.0	0.0	0.0	-0.1	-0.1	-0.2	-0.3	-0.3	-0.4

Table 13.4.13 Dry-Type, Medium-Voltage Transformers: Trial Standard Level 5 Forecast

NEMS-BT 2005 Results:							Extrapolation		
	2000	2005	2010	2015	2020	2025	2030	2035	2038
Commercial Sector Energy Consumption									
Electricity Sales (TWh)	1,159	1,262	1,467	1,651	1,857	2,092	2,157	2,211	2,247
Natural Gas (EJ)	3.43	3.33	3.68	3.89	4.14	4.40	4.59	4.80	4.98
Other (EJ)	0.99	0.99	1.10	1.15	1.20	1.27	1.32	1.38	1.41
Natural Gas (Quads)	3.25	3.16	3.49	3.69	3.92	4.17	4.35	4.55	4.72
Other (Quads)	0.94	0.94	1.04	1.09	1.14	1.20	1.25	1.31	1.34
Total U.S. Electric Generation									
Coal (TWh)	1,967	2,073	2,235	2,320	2,531	2,907	3,174	3,417	3,597
Gas (TWh)	601	679	913	1,163	1,346	1,385	1,369	1,383	1,369
Petroleum (TWh)	111	119	124	132	140	147	122	115	113
Nuclear (TWh)	754	796	813	826	830	830	830	828	824
Renewables (TWh)	355	409	436	443	465	496	516	521	527
Total (TWh)	3,788	4,076	4,521	4,883	5,312	5,764	6,011	6,264	6,430
Installed Generating Capacity									
Coal (GW)	314.7	314.5	314.2	320.1	347.5	399.0	436.1	470.4	496.0
Other Fossil (GW)	283.0	442.5	451.6	452.3	508.5	549.3	567.0	571.2	577.9
Nuclear (GW)	98.3	99.7	100.6	102.2	102.7	102.7	102.7	102.7	102.7
Renewables (GW)	93.1	100.2	102.1	103.1	107.8	114.2	118.6	119.7	121.1
Total (GW)	789.1	956.9	968.5	977.7	1,066.5	1,165.2	1,224.4	1,264.0	1,297.7

Difference from TMY System Load Reference Case							Extrapolation		
	2000	2005	2010	2015	2020	2025	2030	2035	2038
Commercial Sector Energy Consumption									
Electricity Sales (TWh)	0.0	0.0	-0.3	-0.8	-1.3	-1.8	-2.3	-2.8	-3.2
Natural Gas (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total U.S. Electric Generation									
Coal (TWh)	0.0	0.0	0.0	-0.2	-0.9	-1.3	-1.1	-1.5	-2.2
Gas (TWh)	0.0	0.0	-0.3	-0.5	-0.3	-0.4	-1.2	-1.3	-0.9
Petroleum (TWh)	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0
Nuclear (TWh)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (TWh)	0.0	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.2
Total (TWh)	0.0	0.0	-0.4	-0.8	-1.3	-1.9	-2.4	-3.0	-3.3
Installed Generating Capacity									
Coal (GW)	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.1	-0.2	-0.3
Other Fossil (GW)	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.3	-0.3	-0.3
Nuclear (GW)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (GW)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total (GW)	0.0	0.0	0.0	-0.1	-0.2	-0.3	-0.4	-0.5	-0.6

Table 13.4.14 Dry-Type, Medium-Voltage Transformers: Trial Standard Level 6 Forecast

NEMS-BT 2005 Results:							Extrapolation		
	2000	2005	2010	2015	2020	2025	2030	2035	2038
Commercial Sector Energy Consumption									
Electricity Sales (TWh)	1,159	1,262	1,467	1,651	1,857	2,092	2,157	2,211	2,247
Natural Gas (EJ)	3.43	3.33	3.68	3.89	4.14	4.40	4.59	4.80	4.98
Other (EJ)	0.99	0.99	1.10	1.15	1.20	1.27	1.32	1.38	1.41
Natural Gas (Quads)	3.25	3.16	3.49	3.69	3.92	4.17	4.35	4.55	4.72
Other (Quads)	0.94	0.94	1.04	1.09	1.14	1.20	1.25	1.31	1.34
Total U.S. Electric Generation									
Coal (TWh)	1,967	2,073	2,235	2,320	2,531	2,907	3,174	3,417	3,597
Gas (TWh)	601	679	913	1,163	1,346	1,385	1,369	1,383	1,369
Petroleum (TWh)	111	119	124	132	140	147	122	115	113
Nuclear (TWh)	754	796	813	826	830	830	830	828	824
Renewables (TWh)	355	409	436	443	465	496	516	521	527
Total (TWh)	3,788	4,076	4,521	4,883	5,312	5,764	6,011	6,264	6,430
Installed Generating Capacity									
Coal (GW)	314.7	314.5	314.2	320.1	347.5	399.0	436.1	470.4	496.0
Other Fossil (GW)	283.0	442.5	451.6	452.3	508.5	549.3	567.0	571.2	577.9
Nuclear (GW)	98.3	99.7	100.6	102.2	102.7	102.7	102.7	102.7	102.7
Renewables (GW)	93.1	100.2	102.1	103.1	107.8	114.2	118.6	119.7	121.1
Total (GW)	789.1	956.9	968.5	977.7	1,066.5	1,165.2	1,224.4	1,264.0	1,297.7

Difference from TMY System Load Reference Case							Extrapolation		
	2000	2005	2010	2015	2020	2025	2030	2035	2038
Commercial Sector Energy Consumption									
Electricity Sales (TWh)	0.0	0.0	-0.3	-0.8	-1.3	-1.8	-2.3	-2.8	-3.2
Natural Gas (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total U.S. Electric Generation									
Coal (TWh)	0.0	0.0	0.0	-0.2	-0.9	-1.3	-1.1	-1.5	-2.2
Gas (TWh)	0.0	0.0	-0.3	-0.5	-0.3	-0.4	-1.2	-1.3	-0.9
Petroleum (TWh)	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0
Nuclear (TWh)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (TWh)	0.0	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.2
Total (TWh)	0.0	0.0	-0.4	-0.8	-1.3	-1.9	-2.4	-3.0	-3.3
Installed Generating Capacity									
Coal (GW)	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.1	-0.2	-0.3
Other Fossil (GW)	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.3	-0.3	-0.3
Nuclear (GW)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (GW)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total (GW)	0.0	0.0	0.0	-0.1	-0.2	-0.3	-0.4	-0.5	-0.6

Table 13.4.15 Liquid-Immersed Trial Standard Level 2 Low Economic Growth Forecast

NEMS-BT Results:							Extrapolation		
	2000	2005	2010	2015	2020	2025	2030	2035	2038
Commercial Sector Energy Consumption									
Electricity Sales (TWh)	1,159	1,260	1,456	1,625	1,801	2,007	2,066	2,116	2,148
Natural Gas (EJ)	3.43	3.32	3.66	3.83	4.00	4.23	4.41	4.62	4.79
Other (EJ)	0.99	0.98	1.10	1.14	1.19	1.24	1.30	1.36	1.39
Natural Gas (Quads)	3.25	3.15	3.47	3.63	3.79	4.01	4.18	4.38	4.54
Other (Quads)	0.94	0.93	1.04	1.08	1.13	1.18	1.23	1.29	1.32
Total U.S. Electric Generation									
Coal (TWh)	1,967	2,065	2,212	2,274	2,383	2,611	2,842	3,058	3,216
Gas (TWh)	601	671	860	1,074	1,267	1,365	1,356	1,370	1,357
Petroleum (TWh)	111	118	120	127	145	141	117	110	108
Nuclear (TWh)	754	796	813	826	830	830	830	828	824
Renewables (TWh)	355	410	430	436	449	471	488	493	498
Total (TWh)	3,788	4,060	4,435	4,736	5,073	5,418	5,633	5,859	6,005
Installed Generating Capacity									
Coal (GW)	314.7	314.5	313.7	316.1	327.9	359.3	390.6	421.0	443.7
Other Fossil (GW)	283.0	442.4	449.9	436.4	488.7	534.3	548.2	552.2	558.7
Nuclear (GW)	98.3	99.7	100.6	102.2	102.7	102.7	102.7	102.7	102.7
Renewables (GW)	93.1	100.1	101.6	102.1	104.6	108.8	113.2	114.2	115.5
Total (GW)	789.1	956.7	965.8	956.8	1,023.8	1,105.1	1,154.7	1,190.2	1,220.6

Difference from TMY System Load Low Growth Reference							Extrapolation		
	2000	2005	2010	2015	2020	2025	2030	2035	2038
Commercial Sector Energy Consumption									
Electricity Sales (TWh)	0.0	0.0	-1.9	-4.4	-7.3	-10.4	-13.6	-17.0	-19.0
Natural Gas (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total U.S. Electric Generation									
Coal (TWh)	0.0	0.0	-0.7	-1.4	-2.4	-4.1	-5.9	-9.3	-12.5
Gas (TWh)	0.0	0.0	-0.9	-2.2	-2.9	-5.0	-6.6	-6.6	-5.2
Petroleum (TWh)	0.0	0.0	0.0	-0.2	-1.3	-0.1	0.2	0.2	0.2
Nuclear (TWh)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (TWh)	0.0	0.0	-0.1	-0.3	0.0	-0.5	-0.9	-1.0	-1.1
Total (TWh)	0.0	0.0	-1.7	-4.0	-6.7	-9.7	-13.2	-16.8	-18.6
Installed Generating Capacity									
Coal (GW)	0.0	0.0	-0.1	-0.2	-0.3	-0.6	-0.7	-1.2	-1.7
Other Fossil (GW)	0.0	0.0	0.0	-0.7	-1.0	-1.3	-1.9	-2.0	-2.0
Nuclear (GW)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (GW)	0.0	0.0	0.0	0.0	0.0	-0.1	-0.3	-0.3	-0.3
Total (GW)	0.0	0.0	-0.1	-0.9	-1.4	-2.0	-2.8	-3.5	-4.0

Table 13.4.16 Dry-Type, Low-Voltage Transformers: Trial Standard Level 1 High Economic Growth Forecast

NEMS-BT Results:							Extrapolation		
	2000	2005	2010	2015	2020	2025	2030	2035	2038
Commercial Sector Energy Consumption									
Electricity Sales (TWh)	1,159	1,264	1,465	1,664	1,884	2,140	2,199	2,247	2,279
Natural Gas (EJ)	3.43	3.33	3.69	3.98	4.24	4.59	4.79	5.01	5.19
Other (EJ)	0.99	1.00	1.10	1.15	1.20	1.29	1.34	1.41	1.44
Natural Gas (Quads)	3.25	3.16	3.50	3.77	4.02	4.35	4.54	4.75	4.92
Other (Quads)	0.94	0.95	1.04	1.09	1.14	1.22	1.27	1.33	1.36
Total U.S. Electric Generation									
Coal (TWh)	1,967	2,079	2,257	2,367	2,682	3,224	3,528	3,793	3,982
Gas (TWh)	601	690	969	1,263	1,376	1,349	1,321	1,333	1,326
Petroleum (TWh)	111	119	126	133	146	149	125	117	115
Nuclear (TWh)	754	796	813	826	830	830	830	828	824
Renewables (TWh)	355	411	438	452	484	529	546	551	557
Total (TWh)	3,788	4,095	4,603	5,041	5,518	6,081	6,349	6,622	6,805
Installed Generating Capacity									
Coal (GW)	314.7	314.5	314.4	325.2	367.6	442.1	483.3	520.6	547.4
Other Fossil (GW)	283.0	442.5	454.1	471.6	522.1	558.5	569.5	574.0	580.7
Nuclear (GW)	98.3	99.7	100.6	102.2	102.7	102.7	102.7	102.7	102.7
Renewables (GW)	93.1	100.3	102.6	104.9	111.3	120.7	125.3	126.5	127.8
Total (GW)	789.1	957.0	971.6	1,003.9	1,103.6	1,224.0	1,280.8	1,323.8	1,358.7

Difference from TMY System Load High Growth Reference							Extrapolation		
	2000	2005	2010	2015	2020	2025	2030	2035	2038
Commercial Sector Energy Consumption									
Electricity Sales (TWh)	0.0	0.0	-5.7	-13.3	-21.4	-29.9	-38.6	-47.4	-52.6
Natural Gas (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total U.S. Electric Generation									
Coal (TWh)	0.0	0.0	-1.2	-8.9	-22.2	-33.2	-19.2	-26.9	-39.1
Gas (TWh)	0.0	0.0	-4.5	-5.5	-2.2	0.4	-20.9	-22.6	-15.5
Petroleum (TWh)	0.0	0.0	0.0	-0.2	-0.6	-0.8	0.2	0.0	0.1
Nuclear (TWh)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (TWh)	0.0	0.0	0.0	-1.0	0.9	0.0	-2.1	-2.2	-2.7
Total (TWh)	0.0	0.0	-5.7	-15.6	-24.1	-33.6	-42.1	-51.6	-57.2
Installed Generating Capacity									
Coal (GW)	0.0	0.0	0.0	-1.1	-3.0	-4.4	-2.2	-3.3	-5.1
Other Fossil (GW)	0.0	0.0	-0.2	-1.6	-1.2	-0.8	-4.9	-4.7	-4.8
Nuclear (GW)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (GW)	0.0	0.0	0.0	-0.2	0.2	-0.2	-0.6	-0.6	-0.8
Total (GW)	0.0	0.0	-0.3	-2.9	-4.1	-5.4	-7.7	-8.6	-10.7

Table 13.4.17 Dry-Type, Low-Voltage Transformers: Trial Standard Level 1 Low Economic Growth Forecast

NEMS-BT Results:							Extrapolation		
	2000	2005	2010	2015	2020	2025	2030	2035	2038
Commercial Sector Energy Consumption									
Electricity Sales (TWh)	1,159	1,260	1,452	1,616	1,787	1,987	2,041	2,085	2,115
Natural Gas (EJ)	3.43	3.32	3.66	3.83	4.00	4.23	4.41	4.62	4.79
Other (EJ)	0.99	0.98	1.10	1.14	1.19	1.24	1.30	1.36	1.39
Natural Gas (Quads)	3.25	3.15	3.47	3.63	3.79	4.01	4.18	4.38	4.54
Other (Quads)	0.94	0.93	1.04	1.08	1.13	1.18	1.23	1.29	1.32
Total U.S. Electric Generation									
Coal (TWh)	1,967	2,065	2,213	2,271	2,379	2,604	2,830	3,043	3,193
Gas (TWh)	601	671	861	1,069	1,260	1,354	1,344	1,356	1,349
Petroleum (TWh)	111	118	120	127	143	141	117	110	108
Nuclear (TWh)	754	796	813	826	830	830	830	828	824
Renewables (TWh)	355	410	430	435	449	471	487	492	497
Total (TWh)	3,788	4,060	4,437	4,728	5,061	5,400	5,608	5,829	5,971
Installed Generating Capacity									
Coal (GW)	314.7	314.5	313.8	315.7	327.4	358.5	389.3	419.3	440.8
Other Fossil (GW)	283.0	442.4	449.9	435.2	487.0	532.1	545.7	549.9	556.4
Nuclear (GW)	98.3	99.7	100.6	102.2	102.7	102.7	102.7	102.7	102.7
Renewables (GW)	93.1	100.1	101.6	102.1	104.6	108.7	112.8	113.9	115.1
Total (GW)	789.1	956.7	965.9	955.2	1,021.7	1,102.0	1,150.5	1,185.8	1,214.9

Difference from TMY System Load Low Growth Reference							Extrapolation		
	2000	2005	2010	2015	2020	2025	2030	2035	2038
Commercial Sector Energy Consumption									
Electricity Sales (TWh)	0.0	0.0	-5.7	-13.3	-21.4	-29.9	-38.6	-47.4	-52.6
Natural Gas (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total U.S. Electric Generation									
Coal (TWh)	0.0	0.0	0.0	-4.1	-5.9	-10.5	-17.4	-24.4	-35.3
Gas (TWh)	0.0	0.0	0.0	-6.5	-9.8	-16.2	-18.9	-20.4	-14.0
Petroleum (TWh)	0.0	0.0	0.0	-0.5	-3.0	-0.3	0.2	0.0	0.1
Nuclear (TWh)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (TWh)	0.0	0.0	0.0	-0.5	-0.1	-1.1	-1.9	-2.0	-2.5
Total (TWh)	0.0	0.0	0.0	-11.6	-18.8	-28.1	-38.1	-46.7	-51.8
Installed Generating Capacity									
Coal (GW)	0.0	0.0	0.0	-0.6	-0.8	-1.4	-2.0	-2.9	-4.6
Other Fossil (GW)	0.0	0.0	0.0	-1.9	-2.7	-3.5	-4.4	-4.3	-4.3
Nuclear (GW)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (GW)	0.0	0.0	0.0	0.0	0.0	-0.2	-0.6	-0.6	-0.7
Total (GW)	0.0	0.0	0.0	-2.5	-3.5	-5.1	-7.0	-7.8	-9.7

Table 13.4.18 Dry-Type, Medium-Voltage Transformers: Trial Standard Level 2 High Economic Growth Forecast

NEMS-BT Results:							Extrapolation		
	2000	2005	2010	2015	2020	2025	2030	2035	2038
Commercial Sector Energy Consumption									
Electricity Sales (TWh)	1,159	1,264	1,471	1,677	1,905	2,169	2,237	2,294	2,331
Natural Gas (EJ)	3.43	3.33	3.69	3.98	4.24	4.59	4.79	5.01	5.19
Other (EJ)	0.99	1.00	1.10	1.15	1.20	1.29	1.34	1.41	1.44
Natural Gas (Quads)	3.25	3.16	3.50	3.77	4.02	4.35	4.54	4.75	4.92
Other (Quads)	0.94	0.95	1.04	1.09	1.14	1.22	1.27	1.33	1.36
Total U.S. Electric Generation									
Coal (TWh)	1,967	2,079	2,258	2,376	2,704	3,256	3,547	3,819	4,021
Gas (TWh)	601	690	974	1,269	1,378	1,349	1,341	1,355	1,341
Petroleum (TWh)	111	119	126	133	147	150	124	117	115
Nuclear (TWh)	754	796	813	826	830	830	830	828	824
Renewables (TWh)	355	411	438	453	483	529	548	554	560
Total (TWh)	3,788	4,095	4,609	5,057	5,542	6,114	6,390	6,673	6,861
Installed Generating Capacity									
Coal (GW)	314.7	314.5	314.4	326.3	370.5	446.4	485.4	523.8	552.5
Other Fossil (GW)	283.0	442.5	454.3	473.2	523.3	559.3	574.4	578.6	585.4
Nuclear (GW)	98.3	99.7	100.6	102.2	102.7	102.7	102.7	102.7	102.7
Renewables (GW)	93.1	100.3	102.6	105.1	111.1	120.9	125.9	127.1	128.6
Total (GW)	789.1	957.0	971.9	1,006.7	1,107.6	1,229.3	1,288.4	1,332.2	1,369.2

Difference from TMY System Load High Growth Reference							Extrapolation		
	2000	2005	2010	2015	2020	2025	2030	2035	2038
Commercial Sector Energy Consumption									
Electricity Sales (TWh)	0.0	0.0	-0.1	-0.2	-0.4	-0.5	-0.7	-0.8	-0.9
Natural Gas (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total U.S. Electric Generation									
Coal (TWh)	0.0	0.0	0.0	-0.2	-0.4	-0.6	-0.3	-0.5	-0.7
Gas (TWh)	0.0	0.0	-0.1	-0.1	0.0	0.0	-0.4	-0.4	-0.3
Petroleum (TWh)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nuclear (TWh)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (TWh)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total (TWh)	0.0	0.0	-0.1	-0.3	-0.4	-0.6	-0.7	-0.9	-1.0
Installed Generating Capacity									
Coal (GW)	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	-0.1	-0.1
Other Fossil (GW)	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1
Nuclear (GW)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (GW)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total (GW)	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.2

Table 13.4.19 Dry-Type, Medium-Voltage Transformers: Trial Standard Level 2 Low Economic Growth Forecast

NEMS-BT Results:										Difference from TMY System Load Low Growth Reference										
							Extrapolation											Extrapolation		
	2000	2005	2010	2015	2020	2025	2030	2035	2038		2000	2005	2010	2015	2020	2025	2030	2035	2038
Commercial Sector Energy Consumption										*Commercial Sector Energy Consumption*										
Electricity Sales (TWh)	1,159	1,260	1,458	1,629	1,808	2,016	2,079	2,132	2,166	Electricity Sales (TWh)	0.0	0.0	-0.1	-0.2	-0.4	-0.5	-0.7	-0.8	-0.9
Natural Gas (EJ)	3.43	3.32	3.66	3.83	4.00	4.23	4.41	4.62	4.79	Natural Gas (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (EJ)	0.99	0.98	1.10	1.14	1.19	1.24	1.30	1.36	1.39	Other (EJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas (Quads)	3.25	3.15	3.47	3.63	3.79	4.01	4.18	4.38	4.54	Natural Gas (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (Quads)	0.94	0.93	1.04	1.08	1.13	1.18	1.23	1.29	1.32	Other (Quads)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total U.S. Electric Generation										*Total U.S. Electric Generation*										
Coal (TWh)	1,967	2,065	2,213	2,275	2,385	2,615	2,847	3,067	3,228	Coal (TWh)	0.0	0.0	0.0	-0.1	-0.1	-0.2	-0.3	-0.4	-0.6
Gas (TWh)	601	671	861	1,076	1,270	1,370	1,362	1,376	1,362	Gas (TWh)	0.0	0.0	0.0	-0.1	-0.2	-0.3	-0.3	-0.3	-0.2
Petroleum (TWh)	111	118	120	127	146	141	117	110	108	Petroleum (TWh)	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0
Nuclear (TWh)	754	796	813	826	830	830	830	828	824	Nuclear (TWh)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (TWh)	355	410	430	436	449	472	489	494	500	Renewables (TWh)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total (TWh)	3,788	4,060	4,437	4,740	5,080	5,428	5,646	5,875	6,022	Total (TWh)	0.0	0.0	0.0	-0.2	-0.3	-0.5	-0.6	-0.8	-0.9
Installed Generating Capacity										*Installed Generating Capacity*										
Coal (GW)	314.7	314.5	313.8	316.3	328.2	359.9	391.3	422.2	445.3	Coal (GW)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1
Other Fossil (GW)	283.0	442.4	449.9	437.1	489.7	535.5	550.0	554.1	560.6	Other Fossil (GW)	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1
Nuclear (GW)	98.3	99.7	100.6	102.2	102.7	102.7	102.7	102.7	102.7	Nuclear (GW)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (GW)	93.1	100.1	101.6	102.1	104.6	108.9	113.4	114.5	115.8	Renewables (GW)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total (GW)	789.1	956.7	965.9	957.7	1,025.1	1,107.0	1,157.4	1,193.5	1,224.4	Total (GW)	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1	-0.2

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